DOCUMENT RESUME

ED 447 790 IR 020 412

AUTHOR Schofield, Janet Ward; Davidson, Ann Locke
TITLE Achieving Equality of Student Internet Access within Schools.
SPONS AGENCY Department of Commerce, Washington, DC.; Spencer Foundation, Chicago, IL.; National Science Foundation, Arlington, VA.
PUB DATE 2000-03-00
NOTE 30p.; Paper presented at the Annual Meeting of the American Educational Research Association (New Orleans, LA, April 24-28, 2000).
CONTRACT RED-9253452; 42-40-94032; 199800209
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Access to Information; *Computer Uses in Education; Educational Technology; Elementary Secondary Education; *Equal Education; *Internet; Qualitative Research; Urban Areas
IDENTIFIERS *Access to Technology; *Technology Utilization

ABSTRACT

One benefit often expected to flow from Internet use in schools is an increase in equality of educational opportunity as all kinds of schools gain access to the same extraordinary set of resources and opportunities for interaction with the outside world. Yet, prior research suggests that patterns of technology access often mirror existing inequalities rather than mitigate them. This paper discusses the issues pertinent to equality of Internet access that arose in NET (Networking for Education Testbed), a project bringing the Internet to a large urban school district. The major data-gathering methods used in this research were qualitative observations, semi-structured interviews, and archival material. It is concluded that numerous factors, including the perception of Internet use as an optional privilege, the use of Internet access as a "carrot" to shape student behavior in desired ways, and many teachers' lack of familiarity with the Internet and computing more generally, resulted in greater access for students who were already ahead of their peers academically and/or with regard to knowledge of computing. (Contains 23 references.) (Author/MES)

Reproductions supplied by EDRS are the best that can be made
from the original document.

ED 447 790

Achieving Equality of Student Internet Access Within Schools

Janet Ward Schofield

and

Ann Locke Davidson

University of Pittsburgh

J. W. Schofield

1

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION
CENTER (ERIC)
This document has been reproduced as received from the person or organization originating it.
Minor changes have been made to improve reproduction quality.
Points of view or opinions stated in this document do not necessarily represent official OERI position or policy.

This paper was presented at the American Educational Research Association, March 2000, New Orleans.

IR020412

BEST COPY AVAILABLE

Abstract

One benefit often expected to flow from Internet use in schools is an increase in equality of educational opportunity as all kinds of schools gain access to the same extraordinary set of resources and opportunities for interaction with the outside world. Yet, prior research suggests that patterns of technology access often mirror existing inequalities rather than mitigate them. This paper discusses the issues pertinent to equality of Internet access that arose in a project bringing the Internet to a large urban school district. It concludes that numerous factors, including the perception of Internet use as an optional privilege, the use of Internet access as a "carrot" to shape student behavior in desired ways, and many teachers' lack of familiarity with the Internet and computing more generally, resulted in greater access for students who were already ahead of their peers academically and/or with regard to knowledge of computing.

The Internet has moved into schools in the U.S. at a remarkable rate. Internet connections in schools were virtually unheard of at the beginning of the 1990's. By 1994 a national sample survey reported that 35% of all public schools were connected. Not long ago the results of a new national survey were announced (Solomon, 1999). They suggest that by the end of this year , 100% of U.S. public schools will have Internet connections. The reported confidence interval of + or - 4.5% surrounding the estimate of 100% only reinforces my basic point here - the Internet has definitely arrived in schools in the U.S.

Many outcomes are expected to emerge from Internet use including decreased isolation of schools from the outside world, increased student motivation and achievement, and increased equality of educational opportunity. The belief that Internet use will lead to increased equality of opportunity is commonplace (Shade, 1999). It is epitomized in President Clinton's assertion that the Internet will "revolutionize" education since "for the first time in the history of America...we can make available the same learning from all over the world at the same level of quality and the same time to all our children" (Clinton, 1996).

However, Internet use in schools is so new that we know very little about whether, how, or under what conditions it will actually effect the students in them. For this reason, the National Science Foundation funded a set of four projects to

serve as national testbeds to explore the potential impact of Internet use on education and to illuminate the kinds of issues that such use will raise. This paper reports some of the results of one of these projects - the Networking for Education Testbed, or NET[1]. Specifically, it deals with the relation between Internet use and the achievement of equality of educational opportunity.

The Internet clearly has the potential to help equalize educational opportunity by making the information and communication resources available to students in all schools more similar than has been the case before. However, prior research on computer use in schools (Becker & Sterling, 1987; Shade, 1999; Sutton, 1991), including some of my own work discussed in my book *Computers and Classroom Culture*, suggests that patterns of technology access and use often mirror and reinforce existing inequalities rather than mitigate them. For example, Becker and Sterling (1997) found that academically strong students use computers more than average or slow students at all school levels. So, it seems utopian to assume that Internet access will automatically lead to greater equality of opportunity as many do.

The goal of this paper is to begin to delineate some of the factors influencing the relation between Internet use in schools and equality of educational opportunity by discussing the issues that arose pertinent to this topic

in NET, a major effort designed to bring the Internet to a large urban school system. One way to approach the issue of equality of educational opportunity is by discussing what could be conceptualized as equality of educational inputs - that is, equality of the pertinent physical, financial, and human resources that schools serving various kinds of students have (Good & Brophy,1986; Harvey & Klein, 1989). This kind of approach would locate the analysis within the framework of concerns about inequality of access to technology that have been very much in the news recently under the rubric of "the digital divide" and that have stimulated an extraordinary amount of activity ranging from White House press briefings to foundation initiatives to public television programs.

Researchers too have been involved in this area and a substantial amount of attention is now being devoted to the issue of the digital divide in schools, resulting in studies that do things like compare the availability of Internet access in schools serving minority group students with those serving white students (Anderson & Ronnkvist, 1999: Coley, Cradler, & Engel, 1997; Hoffman & Novak, 1998; 1999). This work , with its concern about discovering and documenting disparities in the technological tools available in institutions serving different sectors of the population, provides us with very useful information. For example, Anderson and Ronquist's (1999) recent survey of a large sample of

public and private schools in the country concluded that the average household income in the community in which schools are located has a substantial impact on the availability of Internet access. To give just one example, schools in relatively rich communities are twice as likely as those in low income communities to have the kind of high speed connections that make feasible many uses of the Internet. Furthermore, schools with higher percentages of minority students also have less technology than others on many indicators, even after the impact of income has been controlled.

However, as a social psychologist with a long term interest in the social processes occurring within schools, I have taken a very different approach to exploring the issues of equality of school-based access to technology for different sectors of the population. Specifically, my work reflects a strong concern that even if schools with contrasting student profiles were to have equivalent numbers of computers, equivalent kinds of Internet connections, and the like one can not assume that equality of access has been attained because social processes within schools may direct such resources in non-random ways. From my perspective, it is very important to understand what happens within schools that shapes the use of whatever computer resources they have and that potentially channels access to those resources toward certain groups of students.

Before turning to the study's findings, which suggest that such processes do indeed exist, I will very briefly describe the project studied and the methods used in this research.

Networking for Education Testbed and its District Context

The project on which this paper is based, the Networking for Education Testbed, is a collaboration between the Waterford Public Schools, the Wellington Super Computing Center, and the University of Fairfield. This project was funded by the National Science Foundation as one of a set of four projects to serve as national testbeds to explore the potential impact of Internet use on education and to illuminate the kinds of issues that such use will raise.

NET's primary goal, very simply stated, was to bring Internet access to teachers in the Waterford Public Schools for use in instruction. During its five year life, NET provided Internet connections, as well as substantial amounts of training and support, to teams of educators at 29 of the district's 89 schools. It also provided more limited connectivity and support to teachers at another 50 schools within the district.

The district in which NET was located served a student body that is approximately 55% African-American and 45% white. Roughly 60% of the students in the district receive free or reduced price lunches due to limited family

income, although the system also is able to attract and hold a substantial number of students from well-off and highly educated families. Given the existence of a marked and persistent achievement gap between white and African American students, district policy makers were, generally speaking, quite concerned about issues of equality and equity. The fact that both the school board's president and the head of the board's technology subcommittee were African American contributed to creating a policy and political environment sensitive to such issues. Further, NET had as one of its explicit goals using the Internet to increase equality of educational opportunity.

Methods and Data Analysis

The major data-gathering methods used in this research were qualitative observations, semi-structured interviews, and the collection of archival material. Repeated observations were conducted in a wide variety of settings. This includes over 160 hours of observation in over 40 classrooms in which the Internet was being used. It also includes observation of over 125 meetings between different groups of teachers involved with the project. Trained observers used the "full field note" method of data collection (Olson 1976) which involves taking extensive hand-written notes during the events being observed. All notes were made as factual and as concretely descriptive as possible.

To gain insight into participants' perspectives, over 350 semi-structured open-ended interviews were conducted with a wide variety of individuals including more than 185 teachers, 170 students, 30 school district personnel, and 14 NET staff. Such interviews contained numerous specific questions pertinent to the issues discussed here. For example, teachers were asked questions very directly related to equality of access, such as how they decided which students would use the Internet, as well as more general but nonetheless pertinent questions such as whether their actual classroom use of the Internet differed from their planned use of it. Similarly, students were asked both directly pertinent questions, such as those about which students used the Internet in school, and more general but nonetheless potentially relevant questions such as those about the best and worst things about the way the Internet was used in their schools.

Both field notes and interviews were audio-taped, transcribed, coded and then analyzed using established qualitative methods (Miles & Huberman 1984; Strauss & Corbin 1990). In the data analysis, the primary emphasis was on the development and systematic application of thematic categories to all data.

Archival materials were another important source of information pertinent to the issues discussed here. With participants' permission, the research team's address was added to virtually all group e-mail lists connected with the project.

This permitted collection of most normal e-mail between members of the various groups working on this project. In addition, account use data for students was collected at 20 schools over a three year period. Documents, such as the written "activity plans" of teachers using the Internet were also systematically collected.

Finally, a number of on-line and written surveys were conducted with teachers. Pertinent questions on these surveys included those calling for a description of their Internet projects, including demographic information about the students involved in them. Quantitative date from these and other sources were analyzed using appropriate descriptive and inferential statistics

Close attention was paid to triangulating data from individuals occupying different roles in the school system as well as data gathered by different methods from individuals occupying the same or similar roles.

Results

The issue of educational inputs - of how a potentially valuable resource like the Internet should be allocated between schools- arose early in the project and created considerable controversy, since NET did not have enough funds to provide Internet access to every school in the district and the background characteristics of students in different schools varied quite dramatically. However, this paper will focus on an equally important issue that has received

virtually no attention in the existing literature on Internet use in the schools and that received essentially none in NET itself in spite of the salience of issues of equality of opportunity within both the district and the project - the issue of **within school and within classroom level factors** that have implications for equality of Internet access and use. This issue is important because even if educational inputs, such as Internet access, are equal at the school level the question of whether students of different types actually end up with equal access remains.

The first factor leading to inequality of access within schools was the decisions that were made about the particular classes that would be provided with Internet access. Many of the NET projects were located in classrooms serving relatively heterogeneous students, not strikingly different in background or in academic achievement from their peers. However, it was far from uncommon for Internet projects to be found in niches of the schools serving unrepresentative samples of students. When this occurred, it was virtually always in programs serving students who were advantaged in one way or another compared to their peers. So, for example, the NET project in one school that was 99% African American was located in the honors track, which by definition served the most academically able students. As a group, these students tended to come from

somewhat better off families than their peers. Similarly, one of the elementary schools participating in the project focused its Internet efforts on students in the school's magnet program rather than on those in its other classrooms which had a much higher proportion of children with disabilities, limited English proficiency and other disadvantages. This is consistent with the findings of a recent national survey that suggest that teachers who generally teach high performing students are more likely to use the Internet and to feel it is essential to their work than are teachers of low achieving students (Becker, 1998). It was also consistent with the results of a survey we conducted in seven participating schools, in which teachers known to be conducting Internet activities were asked to describe them, including supplying information on the students who were involved. Twenty of the 80 projects described, or a full 25%, involved primarily or exclusively "gifted" or academically advanced students. In stark contrast, only three projects, or roughly 4%, were said to involve primarily or exclusively lower achieving students. Although it is true that the majority of the projects were characterized as being conducted with academically heterogeneous groups of students, the contrast between the number of projects involving strong and weak students is quite striking. A high school student who observed this phenomenon in his school described it this way:

Mark: The foreign language teachers decide who gets to use the Internet. . . . and it's usually on a class basis. Like their higher-level classes will use the Internet, whereas the lower-level classes won't. And unfortunately it's not very easy for other students to get accounts.

Interviewer: And why is that?

Mark: Well, part of it is students don't know where to get the accounts, and...often times I've heard several students given the answer that they're not in the foreign language class [that using the Internet] so they don't really have access to it.

Why did this happen? The reasons for this phenomena appeared to be numerous. However, one came up again and again in discussions of this topic. Since Internet use was seen by most teachers as making their teaching job somewhat more complex, they preferred to use the Internet in classes that were perceived as the easiest to teach and to control. Since honors classes or other classes with advanced students were often small and the students in them generally posed few serious classroom management issues, teachers gravitated toward using the Internet with such classes.

In spite of the tendency to locate Internet projects in classes serving relatively advantaged students, many very heterogeneous classes did receive Internet access through NET as indicated above. However, importantly, our research found equality issues in such cases as well. Specifically, not all students within those classes were equally likely to get access. Before exploring why this happened, I should be clear about the fact that we saw few, if any, cases where teachers blatantly used student characteristics such as race, gender, or socioeconomic status in a way that systematically denied access to any particular group of students within a class. However, several factors did lead to high achieving and advantaged students often obtaining more Internet access than their peers within classrooms with access. I will discuss these one by one.

First, teachers, especially those not working in computer lab settings, tended to see Internet use as a privilege rather than as a basic resource, such as textbooks or library materials, to which all students should have access. This view stemmed from several sources, including the fact that teachers generally had many more students than Internet access points, which meant that Internet access was a scarce good. As such, it was most easily dealt with as a privilege, rather than something to which every student should have equal access.

Another related factor contributing to the view of Internet use as a privilege was that work done on the Internet was often seen as enrichment rather than as part of the core curriculum, so that teachers did not feel a responsibility to assure that all students got to use it. Although this situation was partly due to the relative scarcity of Internet-linked computers, it did not appear to be completely due to this. Rather, teachers had pre-existing curriculum materials and accompanying tests that reflected the core of what they expected students to learn. Internet work tended to be added on to this and understood as enrichment.

Students' generally very positive reactions to access reinforced the image of Internet use as a privilege. Students generally enjoyed using the Internet, often vociferously asking to be allowed to work on it. (Indeed, disputes even developed between classmates about who would get access.) Teachers were well aware of this. In fact 84% of the teachers (N=56) interviewed on this topic reported positive responses on the part of students, saying things like, "They love it, and if they could use it all day they would." Observing such behavior reinforced the image of Internet access as a valued privilege in teachers' eyes.

When Internet access was seen as a privilege, the question of which students within a given classroom deserved that privilege arose. Time and time again a variety of factors conspired to bring greater access to students who were

already better off in one regard or another than to their less advantaged peers. Within any given class, teachers frequently used access as a reward for desired behavior, especially strong academic performance. However, it was also awarded for other kinds of desired behavior ranging from paying attention to the teacher, to remembering to bring in homework on time, to appearing to be trustworthy. As one teacher put it:

> Being (there's) only one computer there, I use it as a reward....so I think it ...made it easier to control some...not control but...to use it as a reward for the kids who are on task and complete their work.

Similarly, behavior of which the teachers' disapproved, especially social behavior of this nature, was seen as reason for removal of this privilege or for failure to bestow it. One middle school student captured his understanding of the process this way:

> Interviewer: Could you tell me what you know about how it's decided what kids get to use the Internet in your class and what kids don't?
>
> Respondent: Like the kids that behave and . . . get A's and B's [get to use it] . . . The bad kids . . . sit in their chair (sic) and write.

Even relatively young students understood the linkage between behavior and Internet access as suggested by the following excerpt from an interview with an elementary school teacher who explained what had happened when he inquired of a group of fifth graders who were temporarily in his class about why they did not know how to use computers or the Internet given that their usual classroom had computers with Internet access:

> [The students said] "Oh, we're not allowed. Well, only certain people are allowed to use it. [....] We're the bad kids, and we're not allowed."[....] We had about fifty kids in one room, and they were "the worst kids" whatever that means. And so I just said .... "What are you interested in?"[....] It was basketball season so we searched for NBA [....] I couldn't tear them away. Any they...were using it in a productive way...in a useful way. And I'm talking about ten minutes of instruction. These kids were so eager. And we knew what their reputàtion is, and they are difficult, but they didn't break the machines.

Teachers persisted in using Internet access as an incentive and reward for desired behavior in spite of the fact that many of them were aware that this caused resentment on the part of some lower achieving students. As one teacher put it:

> Kids who don't have access to it feel as though they're second-rate kids. I mean, they say, "How come those kids get to and we don't?" and I hear it real often. And I don't have an answer. I tell them, "It's because we don't have enough machines. What do you want me to do at this point?"

The tendency to use access as a reward for desired academic and social behavior was compounded by concerns about kinds of materials potentially available on the Internet. Teachers believed that students who had shown that they were strongly motivated to achieve by their superior academic performance would be less likely than many of their peers to veer off into non-educational directions or to flout school rules about the kinds of activities they should engage in while using the Internet. Similarly, students who showed a general pattern of behavior consistent with school rules were seen as more likely to obey rules regarding appropriate use of that access than their peers and hence as better candidates for this privilege. Hence, given that constant surveillance was often impractical, teachers felt most comfortable about giving such students access.

Interestingly, the teachers' power to decide which students got to use the Internet in class appeared to lead to access functioning not only as a reward for desired behavior that would have occurred in any event, but also as a mechanism

to enhance the teacher's control over the classroom, which other research also suggests tends to happen when access to technology use is conceptualized as a privilege (Martin, 1991). As alluded to above, access was highly valued by students. Further, many of them recognized a direct link between access and behavior as did the middle school student quoted previously. Indeed, in some classrooms this link was made very explicit as illustrated by one high school teacher's comments on this topic.

> It's a good disciplinary tool. Like, "Okay, you're not quiet. Forget about the Internet. You're not gonna use it. We'll go back to the textbooks and we'll just go back to the transparencies and write stuff on the board."

Thus, educators could use the promise of access or the threat of removal of access to try to mold student behavior either on the Internet or in other contexts. The control function was clear in the formal acceptable use policies developed at NET schools that typically indicated that undesirable behavior on the Internet was reason for removal of access. It was also highlighted by the fact that a number of teachers spontaneously characterized Internet use as "a carrot" they used to shape student behavior in desired ways. Indeed, one teacher called it "one of the best carrots I've ever found."

Teachers' genuine concern about the academic progress of their weaker students also often contributed to this inequality in access. Since Internet usage was generally not conceptualized as the most direct route to helping students master the core curriculum, many teachers believed that weaker students' time was better spent on more traditional activities. These teachers may have been correct. However, inequality in Internet access for weaker students created yet another potentially important dimension on which they were behind others - computer and Internet skills. Furthermore, the stronger students' greater access to the Internet had the potential to increase any pre-existing motivational differences between them and their academically weaker peers since there was widespread agreement that Internet use was motivating.

Another factor contributing to disparity in access was that many teachers' lacked highly developed knowledge about the Internet and computers more generally (Davidson & Schofield, in press). This led them to give greater access to students who were already knowledgeable in these areas, since knowledgeable students could use this resource most effectively and in a way that made the fewest demands on the teachers' already heavily obligated time. However, such students were disproportionately white, male, and from relatively privileged

backgrounds. Enhanced access, in turn, increased and highlighted the knowledge gap between them and their peers with regard to computer and Internet use.

One factor that appeared to contribute to creating the initial gap in expertise between students from different backgrounds was home access. Again and again in this research students with advanced computer or Internet skills indicated that home access played a role in their acquisition of such skills. Previous research suggests that both males and relatively affluent students are more likely to have home computers and to engage in other activities, such as attending computer camps, than their female and less affluent counterparts (Hess & Miura, 1985; Sutton, 1991). It is also clear that students from affluent backgrounds are more likely to have home computers and Internet access than their less well-off peers (Hoffman & Novak, 1998). Further, white students are more than twice as likely as African-American students to have a computer at home, and adjusting for household income mitigates but does not obliterate this difference (Hoffman & Novak, 1998). Finally, the research of Bob Kraut and his colleagues (Kraut, Scherlis, Mukhopadhyay, Manning, & Kiesler, 1995) suggests that even when the forces that lead to unequal home access to computers on the part of girls or minority group youth are overcome, individuals belonging to these groups may still use that access less than their counterparts and thus have less

chance of developing the skills that come from such use. Thus, these data suggest that the differential in computer skills found in NET between students from different backgrounds may well be prevalent elsewhere.

Finally, students' own in-school behavior also tended to reinforce the disproportionate access created by the factors discussed above. For example, males and students of relatively high socioeconomic status often made disproportionate voluntary use of the Internet in the school library before or after school. Similarly, girls were sometimes less assertive than boys in laying claim to computers, reflecting a different more traditionally feminine style of interaction that served them poorly in the competition for access to this valued resource, a finding consistent with Sadker's and Sadker's (1995) work.

Conclusions

In sum, this study suggests that bringing the Internet to schools in a way that provides equal access for all students is likely to be a complex process. First, there is the important issue of whether this educational input will be distributed across schools in ways that exacerbate existing inequalities, with richer schools and the students in them having greater access. However, this study suggests that even distribution of access across schools serving different kinds of students does not insure that all students will have equal access, a fact that suggests the need to

reconceptualize traditional ways of measuring equality of access. Indeed, as this paper highlights, within any given school access may be located in particular programs or niches that favor access for one group of students over another. In the case studied here, when such disparities occurred they virtually always favored access for relatively advantaged students. Another recent study of students' on-line behavior suggests yet another way in which Internet access can enhance differences in achievement. Specifically, O'Neill and Gomez (1998, November) report in a study of telementoring that students with previous experiences of supportive learning partnerships energetically pursue relationships with telementors, whereas those with fewer positive prior experiences tend not to.

Second, the conceptualization of Internet use as a privilege, teachers' view of it as a tool for enrichment rather than as a mechanism for teaching the core curriculum, their concerns about efficient and effective classroom management, and differences in students' own behaviors can reinforce existing inequalities with regard to computer and Internet skills by leading to inequality of Internet access. The fact that disparities in access occurred within both a district and a project that appeared to have genuine concerns about insuring equal opportunities for students from different backgrounds suggests just how subtle and powerful some of the social processes described in this paper are.

Acknowledgments

The research reported here was funded by Contract No. RED-9253452 with the National Science Foundation and Grant No. 42-40-94032 from the U.S. Department of Commerce as well as grant #199800209 from the Spenser Foundation. All opinions expressed herein are solely those of the authors and no endorsement of the conclusions by the National Science Foundation, the U.S. Department of Commerce, or the Spenser Foundation is implied or intended.

References

Anderson, R., & Ronnkvist, A. (1999). The presence of computers in American schools. Teaching, Learning, and Computing: 1998 Survey (Rep. No. 2). The University of California, Irvine and The University of Minnesota: Center for Research on Information Technology and Organizations. [On line]. Available: http://www.crito.uci.edu/TLC/findings/Internet-Use/startpage.htm

Becker, H.J. (1998). Internet use by teachers: Conditions of professional use and teacher-directed student use. The University of California, Irvine and The University of Minnesota: Center for Research on Information Technology and Organizations.

Becker, H. J., & Sterling, C. W. (1987). Equity in school computer use: National Data and neglected considerations. Journal of Educational Computing Research, 3, 289-311.

Carlitz, R.D., Herman, S.J., Roskies, R.Z., & Levine, M. (1992, January). Common Knowledge: Pittsburgh. A Proposal to The National Science Foundation. Pittsburgh, PA: The University of Pittsburgh, The Pittsburgh Public Schools, and the Pittsburgh Supercomputing Center.

Clinton, W. J. (1996, November 4). Remarks by the president to the people of the Sioux Falls area [on-line]. Available: http://library.whitehouse.gov/Search/Query-PressReleases.html

Coley, R. J., Cradler, J., & Engel, P.K. (1997). Computers and classrooms: The status of technology in J.S. schools. ETS Policy Information Report. ETS Policy Information Center. Princeton, NJ. [on-line]. Http://www.ets.org/research/pic/compclass.html

Davidson, A. L. & Schofield, J. W. (in press). Bringing the Internet to Schools: A case-study of educational and technical professionals' collaboration for change. The Information Society.

Good, T.L., & Brophy, J. E. (1986). School Effects. In M.C. Wittrock (Ed.), Handbook of Research on Teaching (3rd ed. pp. 570-602). New York: MacMillan.

Harvey, G., & Klein, S. (1989). Understanding and measuring equity in education: A conceptual framework. In W. G. Secada (Ed.), Equity in Education (pp. 43-67). New York: Falmer.

Hess, R. D., & Miura, I. T. (1985). Gender differences in enrollment in computer camps and classes. Sex Roles, 13, 193-203.

Hoffman, D. L., & Novak, T. P. (1999, May). The evolution of the digital divide: Examining the relationship of race to Internet access and usage over time. Draft working paper prepared for the public conference "Understanding the Digital Economy: Data, Tools and Research." [on-line]. Available: http://www2000.ogsm.vanderbilt.edu

Hoffman, D. L., & Novak, T.P. (1998). Bridging the Digital Divide: The impact of race on computer access and Internet use. Paper presented at the May 2000 meeting of The National Academy of Science "Exploring the Digital Divide: Charting the Terrain of Technology Access and Opportunity," Washington, DC.

Kraut, R., Scherlis, W., Mukhopadhyay, T., Manning, J., & Kiesler, S. (1995). Homenet: A field trial of residential Internet services. Homenet, 1, 1-8.

Martin, D. (1991). New findings from qualitative data using hypermedia: Microcomputers, control and equity. Computers and Education, 16, 219-227.

Miles, M. B., & Huberman, A. M. (1984). Qualitative data analysis: A source book of new methods. Beverly Hills, CA: Sage.

O'Neill and Gomez (1998, November). Online mentors: Experimenting in science class. Educational Leadership, 54, 39-42.

O'Neill, D.K. & Scardamalia, M. (2000, June). Mentoring in the open: A strategy for supporting human development in the knowledge society. Paper presented at ICLS 2000: International Conference on the Learning Sciences, Ann Arbor, MI.

Sadker, M.. & Sadker, D. (1995). Failing at fairness: How our schools cheat girls. NY: Touchstone.

Schofield, J. W. (1995). Computers and classroom culture. New York: Cambridge University Press.

Schofield, J.W. & Davidson, A. (in preparation). The Internet in school: Promise and Problems.

Shade, L. R. (1999). Net gains: Does access equal equity? Journal of Information Technology Impact 1(1), 25-42.

Solomon, G. (October, 1999). CoSN Notes [On-line]. Available: http://www.cosn.org.

Sutton, R. E. (1991). Equity and computers in the schools. Review of Educational Research, 61, 475-503.

Endnotes

1. Pseudonyms are used throughout this paper for all individuals, institutions and places in order to protect the confidentially of those participating in this research. Similarly, titles have sometimes been changed to protect confidentiality, although not in a way that would be misleading about the institution for which an individual works or the general nature of their responsibilities.